Unravelling forest structure change over forested landscapes with Lidar and Gini coefficient

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We carried out an analysis of the Lorenz curve to quantify the complexity of forest structure, and classify woodlands into forest structural types, using airborne laser scanning (ALS) for evaluating differences at landscape scales. The Lorenz curve links the shape of a tree diameter distribution with its basal area-weighted counterpart through their ranked cumulative distributions. When applied to study tree sizes in forests, the Lorenz curve expresses the dominance of each tree in relation to its relative contribution to the total stem density and basal area. The Gini coefficient (GC), a measurement of the area under the Lorenz curve, was applied to discriminate uneven-sized forest areas from even-sized ones. For this purpose, we employed its middle GC=0.5 value, which asymptotically corresponds to a theoretical uniform distribution and therefore represents maximum entropy. Moreover, studying the asymmetry of the Lorenz curve proved useful for evaluating the relative development in the understory, and therefore characterizing competition conditions among tree populations. These methods applied to ALS remote sensing have allowed evaluating patchy patterns in forest structure and assessing differences across landscapes related to management practice.